

PALEOCLIMATOLOGY AND WATER RESOURCES MANAGEMENT: TIME FOR AN INTEGRATED PALEO RESOURCE?

Point of Departure for a Working Group Discussion
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The rivers of the western U.S. provide water resources vitally important to economic and social interests throughout the region. Water managers must balance the competing demands and changing needs of expanding populations, and agricultural and natural ecosystems within the constraints of a variable and limited water supply, interstate and international compacts, and the uncertain impacts of global variability and change. Many operational water management procedures and decision processes have traditionally consider only instrumental period hydroclimatic variability with design specifications based on the 20th century range of hydroclimatic extremes. This approach presumes that the range of flow in the 20th century adequately represents the full range of variability. However, dendrochronological reconstructions of annual runoff Upper Colorado River basin, for example, have demonstrated that the instrumental record for this region does not represent the full range of natural variability.

Water managers in some parts of the western U.S. have started to seriously consider the information provided by extended records of flow from tree-ring reconstructions. Reconstructions are being used to place the recent drought into a long-term context and, in some cases, as model input to test the robustness of water supply systems under a broader range of drought conditions than afforded by gage records. The reconstructed streamflow records have proven to be a useful addition to the toolkit water resource managers are using for planning and decision making.

Tree-ring based reconstructions of streamflow exist for several major watersheds in the western U.S. (e.g., Colorado, Sacramento, Columbia). However, there are likely many watersheds of importance to water resource managers for which reconstructions of streamflow currently do not exist. In addition, it should be recognized that tree-ring reconstructions of streamflow for the distant past cannot take into account factors that change streamflow measured at a certain point even when upstream precipitation remains the same, such as stream channel profile (affected by incision, alluvial deposition, beaver activity, etc.), vegetation cover (affected by plant species dynamics, wildfire, landslides, etc.), land use (due to human activities, such as cattle or sheep grazing, clearcutting, crop production, urban development, etc.), diversions and their return flow (caused by either natural or human agents). As a community, we should start educating our audience to understand that the advantage of having long tree-ring records can be enhanced by using a combination of empirical and mechanistic (or model-based) approaches.

The goal of this workshop is to explore the interest and support for a integrated collaborative effort to generate an up-to-date, spatially focused network of reconstructions to assist water resource managers in long-term planning and scientists examining questions of hydrologic response to climate change. The intent is not to usurp planned or current efforts, but to plan how existing and future reconstructions, modeling results, and products could be integrated into a comprehensive resource for water resource managers. Anyone who has an interest in this subject, either from a scientific or water management perspective, is invited attend this working group discussion. We will begin with a roundtable so that participants may introduce themselves and their interests, then discuss the initiative described above.